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AUTHOR Wigand, Rolf T.
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ABSTRACT

This paper focuses on the environmental influences of change in the communication structure of organizations and argues that structural changes in communication networks are increasingly externally induced. The unit of analysis selected for discussion in this paper is the individual organization. A communication network among organizations is generated when analyzing the communication relationships among these organizations along a certain topic or dimension. A network analysis computer program developed at Michigan State University allows with considerable ease the identification of network roles that individual organizations might perform such as group membership, liaisons, and so on. In addition, each individual organization or group of organizations can now be assessed with regard to a degree of centrality, accessibility, dominance, integrativeness, connectedness, and various other indices. Furthermore, suggestions for the development of a dynamic model encompassing exogeneous influences, internal system processing, and endogenous events are made. Some examples of interorganizational communication are discussed, and the implications of interorganizational communication are presented. (Author/RB)

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Interorganizational Communication Among Complex Organizations

Rolf T. Wigand

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Department of Communication
Michigan State University
East Lansing, Michigan

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Abstract

The author suggests the need for an increased concern with interorganizational communication among large, complex organizations. It is theorized that other organizations are components of increasing importance in the evolution of communication structure of any focal organization and in the emergence of communication environments. A number of areas relevant to interorganizational communication are explored in this paper.

The presented theoretical framework allows the generalizability of interorganizational communication to all living systems, not just organizations. A distinguishing characteristic between living and non-living systems--the organization is viewed as a living system--is the capability of progression or evolution. Evolutions become observable in living systems through the progression from less complex to more complex states of organization.

Little attention has been paid to the effects and significance of communication among complex, social systems. There is evidence that the more energy a system devotes to information input processing (as opposed to productive and maintenance activity), the more likely is the system to survive. In the past, the focus of attention has been almost entirely on information processing within social systems. A review of the literature suggests evidence of increasing interdependence of organizations, thus decreasing the amount of enjoyed autonomy. In addition, it has been suggested that the success of an organization increases the more it develops its ability to establish symbiotic relationships with other organizations.

This paper focuses on the environmental influences of change in the communication structure of organizations and argues that structural changes in communication networks are increasingly externally induced. The author recognizes that external communication environments are changing faster than ever before, thus suggesting, if the above argument holds, a need to study the effects and implications upon the system-internal communication environment and structure. Such study, in turn, demands an extensive understanding of the dynamics existing in the communication environment within which related organizations operate. It is suggested that other organizations are important components in the emergence of communication environments and the evolution of communication structure of any focal organization.

The unit of analysis, selected for discussion in this paper, is the individual organization. A communication network among organizations is generated when analyzing the communication relationships among these organizations along a certain topic or dimension. A network analysis computer program developed at Michigan State University allows with considerable ease the identification of network roles that individual organizations might perform such as group membership, liaisons, etc. In addition, each individual organization or group of organizations can now be assessed with regard to a degree of centrality, accessibility, dominance, integrativeness, connectedness and various other indices. Furthermore, suggestions for the development of a dynamic model encompassing exogenous influences, internal system processing and endogenous events are made.

A number of implications with regard to the importance of interorganizational communication are presented; some examples are discussed.

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Interorganizational Communication among Complex Organizations

Rolf T. Wigand*

Introduction

If communication researchers are to gain significant insight into certain aspects of organizational behavior, there is a need to consider interorganizational communication. Most organizational communication research has dealt only with individuals within the organization and not with the organization per se. Much emphasis has been directed to the notion of organizational change or components thereof. Various approaches in organizational development, group dynamics, etc, stress the importance of the concept of change. Few studies, however, attempt to identify and measure a set of variables that are causative of change and/or whose recognition necessitates a specific, desired change. This author attempts to conceptually differentiate between exogenous and endogenous variables that may affect a change in the communication structure of organizations. It will be argued that change in the communication structure primarily is induced externally. In the past most researchers became aware of a need for change because of symptoms suggesting change such as performance measures, disturbances or breakdowns in communication, etc. Few studies have dealt with the specification of the causal aspects, the emergence, and the origin of change.

It is attempted to methodologically and conceptually identify those variables that are largely instrumental for generating an existing communication behavior among organizations and how the existence of these variables might influence the internal communication structure of a given representative organization

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*Ph.D. student at Michigan State University, Department of Communication.

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operating in an environment. There are two main sets of variables that are discussed in this context. First, there are environmental (exogenous) variables that influence the focal organization. A subset of the environmental variables would be information channels, the content transmitted, a description of the state of the environment, and others. Secondly, it is attempted to focus on the internal information processing structure of the organization. The internal information processing structure is understood as the flow of communication occurring within the organization that is structurally represented in the form of a communication network, groups or subsets thereof. This paper attempts to focus on a general set of communication relationships that encompass the individuals within an organization, the organization per se, as well as the immediate organizational environment composed of a set of interdependent organizations.

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Figure 1 about here
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The utilization of differential equation models is suggested that allow for replication of the basic characteristics of the discussed communication flow. It is emphasized that this behavior is not static, but dynamic in nature. The scope of the model encompasses exogenous influences, internal system processes, and endogenous events.

Interorganizational communication relationships

Organizations are evolutionary formations. They emerge, exist and change for the realization of basic human values. Such social formations consist of roles, norms, and statuses.* A set of organizations operating in a given, joint

*Much of such classificatory information can now be generated with considerable ease for large, complex organizations (up to 5,000 individuals) through a computerized network analysis program developed at Michigan State University.

environment is to some degree interdependent and may be viewed as a system. An interorganizational relationship, then, is understood as the interaction between two or more organizations which is affected by the nature of the interaction pattern and the conditions under which such interactions occur.

Most organization scholars have been concerned with intraorganizational phenomena and few have studied interorganizational phenomena. A large number of studies have already investigated whether or not it makes a difference that communication passes through channels that are highly structured or diffused, open or closed. It is known then that the shape of communication networks decisively affects the quality and role of communication as well as the behavior of the network participants. Few studies, however, have looked at the influences that are responsible for certain formations in natural, complex organizations. Emery and Trist (1965) emphasize the processes occurring in various subsets of the organization and the environment in which it operates. The scheme of these authors still seems to emphasize system-internal and intra-system processes, although it allows for "processes through which parts of the environment become related to each other--i.e., its causal texture--the area of interdependencies that belong within the environment itself."

It is this latter environmental sphere, described as the causal texture of the environment, that is the primary area of discussion for the purposes of this paper. This area has been further described by Evan (1965) as the "organization-set". In Evan's conceptualization--developed from Merton's 'role-set'--the unit of analysis is an individual organization or a class of organizations and its interactions that are mapped with the relevant network of organizations in its environment.

All such interorganizational relationships occur in some sort of communicative form: they may be formal, social, using various channels for the transmission of messages (phones, letters, etc.). They may flow between and among organizations, groups, individuals and combinations thereof. A number of writers have been concerned with such variables as the size of the organization, propinquity, interdependency, informal interactions (invisible colleges), etc. Levine and White (1961) offer an explanation for the relationships among social organizations by viewing them as being involved in an exchange system. The authors attempted to obtain data on the entire matrix of interorganizational relations of health organizations within one community. The findings are represented in the form of entries in sociometric matrices indicating the amount of communication, referrals, joint activities, and transfer of resources between different types of organizations.

Levine and White (1961) propose an "exchange model" of interorganizational relationships in which organizations that share domain consensus are able to unilaterally, reciprocally, or jointly allocate scarce resources of clients, labor services, and other resources.

Somewhat peripherally with regard to our intentions, Litwak and Hylton (1962) specify conditions under which coordinating agencies will arise, i.e., formal organizations whose major purpose is to order behavior between two or more independent organizations. Their conceptual framework argues that coordinating agencies will emerge and continue in existence as long as formal organizations are partly interdependent, the organizations are aware of this interdependence and it can be defined in standardized units of action.

Reid (1965, 1969) proposes a thesis of relations among autonomous organizations by adding to the theoretical framework of Levine and White (1961) and Litwak

and Hylton (1962) Reid suggests that there are three basic modes of behavior in interorganizational relationships: independence, interdependence, and conflict.

For our purposes, interorganizational relationships are viewed as they are reflected in the nature and flow of communication between and among organizations. The set of organizations to be selected for our analysis will depend on the degree of interdependence and the extent to which they operate in the same environment.

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Figure 2 about here
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This writer suggests that a minimum set of communication variables can be identified that encompass the most salient aspects of interorganizational communication. The variables may be viewed as the state variables whose values and variances define the state of communication aspects existing within a given, focal organization. This state is reflected in various communication networks and the relationships to be detected within such a network. This entire process, exogenous communication variables--modified by the environmental conditions--that influence the communication structure of a focal organization can be represented in form of a model as represented in Figure 2. A discussion about the selection and measurement of such variables is presented in the following section.

Exogenous variables and network analytic measurement

In order to represent interorganizational communication behavior successfully, it seems, an information-theoretic measure is desirable. In this respect, the natural unit with which to measure communication is the "bit". One bit measures the change in uncertainty that results from the receipt of a given communication (Miller, 1953). Such a measure would constitute a perfectly acceptable form for our purposes. A measurement difficulty can readily be seen when considering the quantitative assessment of important social contacts between individuals of interdependent organizations.

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Information-theoretic measurement, however, represents considerable operational difficulties for the social scientist. There is some question as to what extent information-theoretic measurement can be utilized in macro-social analysis at the present time. A more observable form of communication measurement which lends itself to be monitored with considerable ease, is word flow rather than information-theoretic inputs. Word flow can be specified with regard to frequency, quantity, duration and, to some degree, importance. The word is then suggested as the basic unit of analysis of communication occurring between and among organizations.

Additional difficulties are encountered in measuring and describing the condition of the environment through which interorganizational communication flows and is influenced by. The environmental condition can be ascertained by describing the characteristics of the larger social and industrial units in which the organization is located--community, industry, region, etc. Some suggestions as well as classification schemes are presented by Weick (1969) and Emery and Trist (1965). Weick (1969), for example, emphasizes the enacted environment which identifies the information space outside the organization and is understood as a composite of the various viewpoints of the organization's members. Emery and Trist (1965) identify four main types of environments, each of which is based on a significantly different conception of the information space of a given organization:

1. the placid, randomized environment is a state in which the organizational goals and the relevant noxiants are considered to be relatively stable and are distributed randomly;

2. the placid, clustered environment describes a condition in which the goals of the organization and the noxiants are non-randomly distributed, i.e., they have developed a pattern and are clustered;

3. the disturbed, reactive environment is characterized by the fact that there are a number of similar organizations operating competitively in the same general environment; and

4. the turbulent environment is recognized by the organization due to the unstable, unpredictive, complex condition that is generally difficult to cope with.

Each of these four descriptive states of the environment, it is argued, may significantly influence the communication behavior of organizations. The researcher ought to be aware of the relative condition of the environment if he is concerned with the behavioral patterns of organizations operating within this environment.

The interorganizational communication variables suggested here are measures of the amount, frequency, duration and importance of information transfer among organizations operating in the same environment. Additional measures such as "distance" between organizations, communication cost and others can be ascertained and considered in the model. It is obvious that communication is essential to coordinate interorganizational activities and, to some extent, dependencies and it is the author's contention that interorganizational communication (as defined above) affects the focal organization's communication structure.

Interorganizational communication variables are assumed to be generated independently of the communication model to be described in the following section. If this relationship holds true, such a variable can be used as a test signal of the model. Exogenous variables allow the researcher to see how the internal system of the model reacts to a specific behavioral pattern, in this case communication flow, in the environment external to the system. Exogenous variables are treated as if the reaction of the system under investigation has no feedback loop to the exogenous variables. They are themselves considered to be independent of what happens in the model and as such allow the researcher to investigate how

the system under study would react to assumed changes in a specific environment.

It is suggested that the existing communication structure of a focal organization at a given point in time is treated as the endogenous variable. It is hypothesized that the influence of the exogenous communication variables alter and shape the form of a communication network. The communication structure of organizations has been studied in various ways; the analysis of communication networks has recently enjoyed considerable attention among a group of researchers at Michigan State University. In the past, an important drawback constituted the storage of sociometric information in the form of sociomatrices, i.e., as the network becomes large in size, meaningful and manageable analysis becomes increasingly difficult. Even the use of computers in storing sociometric data in matrix form is inefficient and prohibitively expensive as the network becomes large. An algorithm was developed by Richards (1971) that overcame this problem. In the meantime, this approach has been computerized in a complex program that allows for the efficient and inexpensive analysis of social systems of up to 5,000 individuals.

Communication networks are generated when analyzing the communication relationships among members of an organization along a predetermined dimension. The recognition of various patterns in existing relationships among network members allows individuals to be classified into various roles: group and bridge members, liaisons, isolates, etc. Once a communication network has been categorized, the structural properties of particular network patterns become of theoretical importance and can be described and measured with various graph-theoretic and information-theoretic approaches. Some of these appear in the form of indices such as connectivity, integrativeness, flexibility, accessibility and others. Connectivity is understood as a ratio between the actual number of links that an

individual has and the number of possible links. Integrativeness is a measure of the degree to which individuals with which a particular individual is linked are linked with each other. Flexibility is an index that indicates the degree to which individuals are flexible to contact each other. Accessibility of an individual is a measure that precisely indicates the number of steps necessary to reach a given individual in a network. Most of these indices are also applicable when focusing on the group as a unit of analysis in a given communication network. Each individual's communication relationship can be measured with regard to content, frequency, duration, importance as well as directionality and reciprocity.

This last discussion indicates that the state of a given communication structure existing in an organization can be rather accurately measured and described. Next, one might question the overall meaning that is represented by focusing on the relationship between the exogenous variables and the resulting communication structure within an organization. In the following section, some attempts are made to conceptually integrate the above discussion in the form of a dynamic model of interorganizational communication behavior.

Dynamic modeling of interorganizational communication

One of the primary tasks that a theoretical model brings about for the social scientist is the identification and selection of relevant variables--and to some extent hypotheses--from a large number of possible variables. The selection of variables is, of course, of crucial importance if the proposed model is to represent the natural behavior of the system. Obviously, our model should demonstrate how changes in the communication transfer will produce changes in the communication structure.

It is known that organizations are adaptive systems, i.e., they react to some degree to influences from the environment that produce internal system

changes. The ideal organization--no doubt--is self-organization, an ultrastable machine. Self-organization, however, requires a control element that changes the direction and magnitude of the system's responses such that the organization protects itself from internal as well as external disturbances. To measure the regulatedness of a system presents difficulties. The distinction between the world as sensed and the world as acted upon defines the basic condition for the survival of adaptive organizations. Given a desired goal state and an existing state of the organization, it is the organization's task to identify the difference between these two states and to determine mediating steps of action such that the difference is minimized or nihilated. The problem to be tackled is the discovery of adequate transition processes or regulatory mechanisms that allow for the generation of the goal state.

The discovery of negative feedback loops in the system alone is not sufficient. Of considerable importance is the amount of time-lag in them. Time delays arise in every stage of the organization's activity. Time delays may occur primarily during internal system processes. It should be noted that some time delays at properly selected points may be the most efficient way to accomplish a certain task or goal, suggesting that not all time lags are to be interpreted negatively. It seems of importance then to detect some variance in the observed behavior at various points in time in order to construct a representative model from which predictions can be made.

The proposed model should be viewed as a system on the basis of continuous flows of the specified variables. Such a model allows for concentration on the central framework of the system and reflects its behavior as observed in reality.

It is assumed that exact mathematical relationships can be specified among the measured variables, but this step would have to wait for the results of actual

tests. The observed behavior can then be described through a set of simultaneous differential equations such that the translation processes producing the behavior can be quantified. In order to generate such equations, it is of importance that the inflows and outflows of communication connected to a structural level must transmit the same kind of items or dimensions that are stored or reflected in a given communication network and its structure. For example, the inflows and outflows of written messages of a particular topic can only be compared to a communication network within the organization that was generated based on questions dealing with written messages about that topic. The researcher should be aware, however, of the possible existence of an interconnecting communication network that constitutes the interconnection between all networks.

The use of mathematics for the measurement of communication flows among organizations and the simultaneous measurement of existing communication networks represents a crucial and first step in research activities concerned with modeling such behavior. As a result, causal factors that determine the change in communication structure can be specified. The causal texture of the emergence of communication structure is discussed in the following section.

The evolution of organizational communication structure

Little is known with regard to the evolution and the formation of communication structure. To develop a model such as described in the previous sections would represent a direction detecting a certain degree of growth, or a change in general, in communication structures such that the relevant variables determining the formation might be specified.

It is well-known that the perpetuation of organizations involves processes of growth and decay, or, in general, development. Little is known about certain forces that stimulate and control formation. What are the forces that elicit

the specialization of individuals in a developing system and result in the appearance of new, multiple and varied functions? Where and how can we detect the mechanisms that control growth? Why does growth or development in and among groups sometimes go astray?

In this context, growth is not understood merely as an increase in size. Increase in size may be viewed as a mere by-product of development that is experienced by an organization or a subset thereof through evolutionary processes such as the recognition of mutual interdependence, extending the information processes, constant change and redesign to fulfill a joint goal in a maximally possible fashion. Throughout this process the organization and its subsets become more complex as they grow. It acquires specialized parts that were not present to begin with and these parts are arranged and utilized in a more elaborate way. Social scientists seem to know that the internal regulator which regulates the organization's or group's rate of growth is capable of making considerable adjustments for interference from environmental obstacles. In this sense, growth in size, then is merely one aspect of the larger process of development.

For the communication researcher, facts and figures about growth are of considerably less interest than the investigation of the many processes--particularly the causal ones--involved in growth and development. Sometimes, it seems, growth in social systems, progresses in many directions simultaneously, and at different speeds in different parts of the same structure. The processes by which individuals and groups form and grow are reflected in the patterns of growth at a higher structural level, such as the organization that they make up as a whole. Social scientists know that the addition of individuals enlarges the organization; the movement and actions of individuals and groups help shape the organization; and that differentiation alters the form and function of

individuals to prepare them for predescribed activities. The evolution of groups as reflected in the communication structure, it seems, is initiated by changes in the structure or location of individuals and/or groups. Individual and group interaction induces individuals to differentiate as well as to prompt groups of individuals to arrange themselves as functioning units of the organization. Such interaction is viewed as a necessary, fundamental part of an orderly development process, if the organization is to survive. It seems that it is the multiplicity of these processes as well as the intricacy of some of them that have delayed an all-out research effort by social scientists.

It was initially indicated that several popular areas of organizational research are concerned with the change and development of behavior of groups as well as individuals who are members of groups. Few studies have dealt with the determination of variables that influence certain desired formation, development or change in groups. A number of conceptual advances for interorganizational analysis have been taken, but remaim empirically unvalidated. In this particular case, such formations, development or change is reflected in the change of the flow processing of communication within and among groups, i.e., these changes will be structural changes when viewed as a directional flow from element to element of that group or set of groups.

This author argues, then, that the measurement of a large number of important growth factors through the specification of relevant exogenous variables and the resulting change in endogenous variables (through network analytic techniques) provide something more than the static level of development at any given time. Such growth factors may be utilized to predict the organization's future as well.

Summary

The author emphasizes an increased concern with interorganizational communication among organizations. It is theorized that the influence of other organizations are of increasing importance in the evolution of communication structure of any focal organization and in the emergence of communication environments. A number of areas relevant to interorganizational communication have been explored in this paper.

The presented theoretical framework attempts the generalizability of interorganizational communication to all living systems, not just organizations. A distinguishing characteristic between living and non-living systems is the capability of progression or evolution. Evolutions become observable in living systems through the progression from less complex to more complex states of organization.

Little attention has been paid to the effects and significance of communication among complex, social systems. There is evidence that the more energy a system devotes to information input processing (as opposed to productive and maintenance activity), the more likely is the system to survive. In the past, the focus of attention has been almost entirely on information processing within social systems. A review of the literature suggests evidence of increasing interdependence of organizations, thus decreasing the amount of enjoyed autonomy. In addition, it has been suggested that the success of an organization increases the more it develops its ability to establish symbiotic relationships with other organizations.

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implications upon the system-internal communication environment and structure. Such study, in turn, demands an extensive understanding of the dynamics existing in the communication environment within which related organizations operate. It is suggested that other organizations are important components in the emergence of communication environments and the evolution of communication structure of any focal organization.

The unit of analysis, selected for discussion in this paper, is the individual organization. A communication network among organizations is generated when analyzing the communication relationships among these organizations along a certain topic or dimension. A network analysis computer program developed at Michigan State University allows with considerable ease the identification of network roles that individual organizations might perform such as group membership, liaisons, etc. In addition, each individual organization or group of organizations can now be assessed with regard to a degree of centrality, accessibility, dominance, integrativeness, connectedness and various other indices.

A number of implications with regard to the importance of interorganizational communication have been presented; some suggestions for needed research have been discussed.

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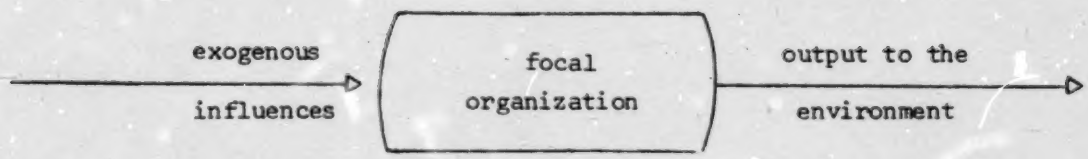

internal system
processing:
endogenous
events

Fig. 1. The organization viewed as the focus of analysis in an environmental context.

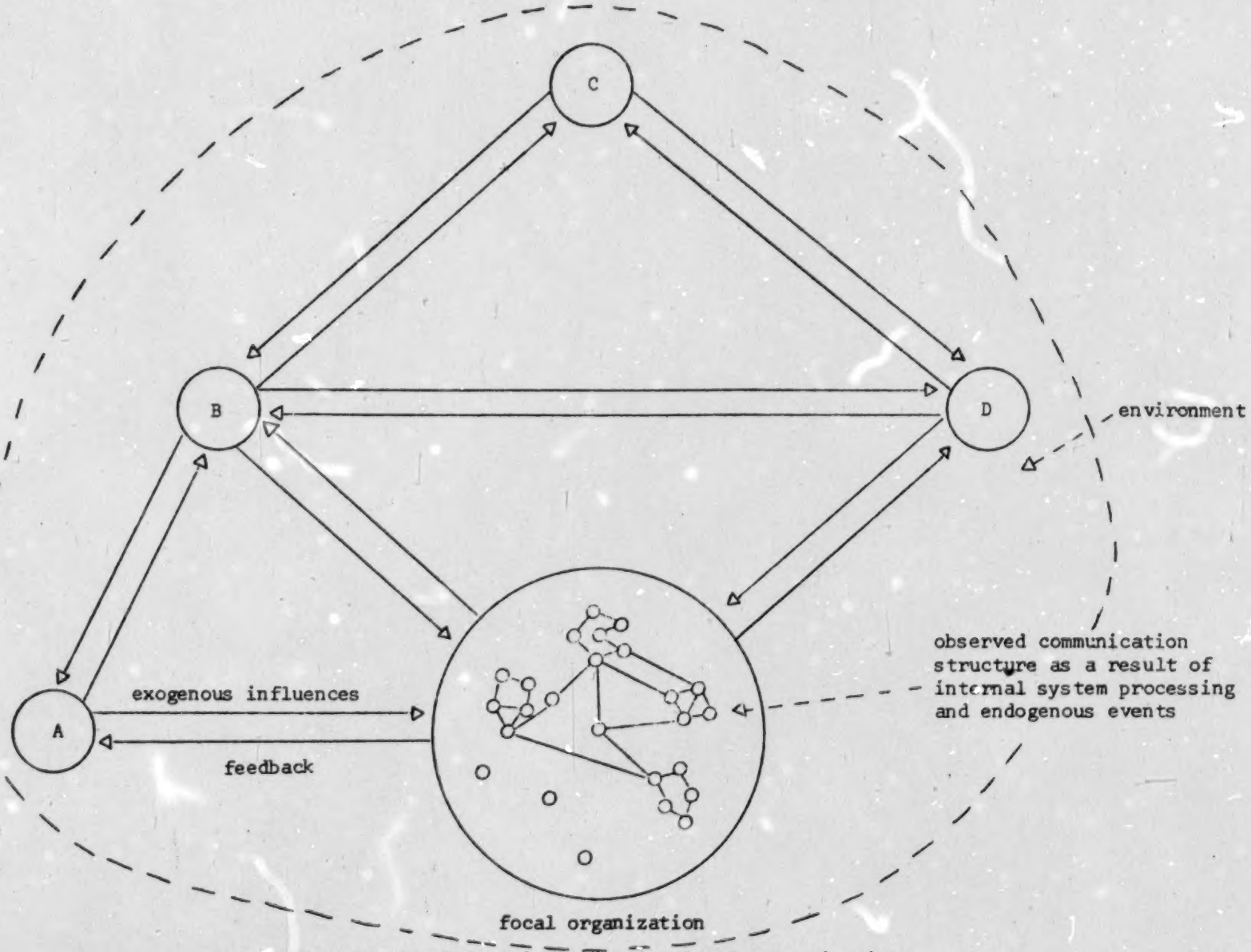

Fig. 2. A model of interorganizational communication.

(NOTE: Organizations A, B, C, D and the focal organization are members